

some from drowning, the loss from the first cause being by far the greatest. As usual, first reports of loss of life were wildly exaggerated, but it would be difficult to exaggerate the effect of the storm on buildings. Only the heaviest construction of masonry and concrete, with cemented tile roofs, came out of the zone of heavy damage unscathed. Concrete walls with "lean" mixtures or too widely spaced reinforcement and with roofs improperly or poorly anchored were wrecked, in many cases with appalling loss of life. The common corrugated iron roofs, put on with smooth or even twisted nails, were carried off like so much cardboard. This material, put on with bolts and nuts over a properly anchored frame, in many cases remained intact. Casualties were 225 dead and 3,000 more or less injured. Property damage, including crops, will total near \$30,000,000. The temporarily homeless were variously estimated from 75,000 up to near a quarter of a million, but these latter figures are somewhat mitigated by the fact that a considerable percentage live in comparatively crude shelters which are quickly replaced. Of crop losses the greatest percentage was citrus, as the citrus belt is almost wholly within the zone of heavy damage. Minor crops were generally a total loss, but they do not represent more than the loss of a single season, whereas citrus and coffee are set back by the loss of much tree growth which will take years to replace. The coffee belt was not all included in the zone of heavy or even moderate damage, but a contributing cause to heavier damage to that industry was the loss of their temporary shade, for which since San Felipe (September 13, 1928) banana plantings had been utilized. Moderate winds will wreck a banana or plantain planting and the heavy stems in falling break the young coffee trees. Sugarcane, in percentage, was probably least injured because, unless actually washed out of the ground by overflow, the canes will continue to grow and will mature. Sugar's greatest damage was to buildings and equipment.

Moderate damage was done on St. Barthelemy, on Tortola, also on St. Thomas and St. John of the United States Virgin Islands. St. Croix reports no damage. Culebra and Vieques, important islands off the east coast of Puerto Rico both suffered heavily; their figures are included in the losses for Puerto Rico.

After passing Puerto Rico, the southern part of Santo Domingo and Haiti felt the storm on the 27th, but no definite reports of losses from these Republics or from Jamaica are available. San Pedro de Macoris (90 miles per hour) and Santo Domingo City (50 miles per hour) give the best idea of intensity in that district.

*Shipping.*—The Bull Line S. S. *Jean* and the lighthouse tender *Acacia* both dragged their anchors in the harbor of Ensenada Honda near Ceiba and grounded. They were both floated by their own efforts after lightening cargo. One ship in San Juan Harbor had her bridge and boats blown away; the U. S. 3-masted schooner *Gaviota* was wrecked also in San Juan Harbor, and several pier buildings were badly wrecked. Otherwise shipping damage was confined to small craft.

*More important storms in Puerto Rican history.*—Santa Ana, July 26, 1825; Los Angeles, August 2, 1837; Santa Elena, August 18, 1851; San Narciso, October 29, 1867; San Felipe (1), September 13, 1876; San Ciriaco, August 8, 1899; San Felipe (2), September 13, 1928; San Nicolas, September 10, 1931; San Ciprian, September 26–27, 1932.

*Comparative data of damages caused by San Ciriaco, San Felipe, San Nicolas, and San Ciprian storms*

	San Ciriaco	San Felipe	San Nicolas	San Ciprian
Loss of life.....	3,000.....	300.....	2.....	225.....
Lowest barometer (San Juan).....	29.23 inches.....	28.81 inches.....	29.17 inches.....	28.95 inches.....
Hurricane winds (San Juan).....	3 hours.....	12 hours.....	2 hours.....	6 hours.....
Maximum wind velocity.....	75 m. p. h.....	150 m. p. h.....	90 m. p. h.....	120 m. p. h.....
Maximum amount of rainfall.....	23.00 inches <sup>1</sup> .....	29.00 inches <sup>1</sup> .....	5.00 inches <sup>2</sup> .....	16.70 inches <sup>2</sup> .....
Advance warnings about storm.....	19 hours.....	36 hours.....	40 hours.....	18 hours.....
Damage to property, crops, etc.....	\$20,000,000.....	\$50,000,000.....	\$200,000.....	\$30,000,000.....

<sup>1</sup> In Adjuntas.

<sup>2</sup> In Maricao.

This storm diminished greatly in intensity after leaving Puerto Rico, and no strong winds were reported west of Haiti. After passing inland near Belize, British Honduras, on October 1, the disturbance moved slightly north of west and dissipated near Vera Cruz, Mexico, on October 3.

Advisory warnings in connection with this disturbance were issued by the Washington office twice daily from September 26 to October 1, inclusive. (See Chart VIII at the end of this REVIEW.)—F. E. Hartwell.

## BIBLIOGRAPHY

C. FITZHUGH TALMAN, in Charge of Library

### RECENT ADDITIONS

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Eredia, Filippo.

Le condizioni anemologiche nella rotta Cagliari-Tunisi. Roma. 1932. 14 p. figs. 24½ cm. (Riv. aeron. Anno 8, N. 8. Agosto 1932–X.)

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**SOLAR OBSERVATIONS****SOLAR RADIATION MEASUREMENTS DURING SEPTEMBER, 1932**

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January, 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above normal values for September at all three stations at which normal incidence measurements are made.

Table 2 shows an excess in the total solar radiation received on a horizontal surface at all pyr heliometric stations except Twin Falls, La Jolla, and Miami. The excess continues to be well marked in the larger cities.

Table 3 again shows diminished turbidity for the month with the decided increase in radiation receipt at Washington.

Polarization measurements obtained on 9 days at Washington give a mean of 57 per cent with a maximum of 65 per cent on the 28th. At Madison, measurements obtained on 12 days give a mean of 60 per cent with a maximum of 69 per cent on the 28th. These are average September values for Madison, but for Washington the values are somewhat above the September normals.

TABLE 1.—Solar radiation intensities during September, 1932

[Gram-calories per minute per square centimeter of normal surface]

**Washington, D. C.**

Date	Sun's zenith distance											
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon	
	75th mer. time	Air mass										Local mean solar time
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	
Sept. 2	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
Sept. 2	17.96			0.49	0.70	1.06					20.57	
Sept. 3	19.89				0.50						19.89	
Sept. 6	16.20		0.76	0.96	1.05						13.13	
Sept. 7	7.57		1.02	1.15	1.26	1.37					7.04	
Sept. 9	10.97				1.27	1.47	1.17				8.48	
Sept. 10	6.27	0.53	0.64	0.76	0.94	1.21					6.76	
Sept. 12	9.47		0.73	0.85	1.16						8.48	

TABLE 1.—Solar radiation intensities during September, 1932—Continued

**Washington, D. C.—Continued**

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0		5.0
Sept. 17	mm. 6.76	cal.	cal.	cal.	0.99	1.14	cal.	cal.	cal.	cal.	cal.	mm. 7.04
Sept. 28	15.65				0.87	1.17	1.44	1.22	1.03	0.81	0.73	12.68
Sept. 29	7.29	0.75	0.83	0.87	1.12	1.17	1.48	1.22				6.76
Sept. 30	4.75	0.86	0.94	1.12	1.26	1.48	1.22					4.95
Means		0.71	0.82	0.90	1.04	1.34	1.20	(1.03)	(0.81)	(0.73)		
Departures		+0.02	+0.07	+0.03	±0.00	+0.03	+0.14	+0.18	+0.08	+0.07		

**Madison, Wis.**

Sept. 6	7.29			1.19	1.27	1.51	1.30				7.57
Sept. 7	8.81			1.16	1.32	1.52	1.33	1.13			6.27
Sept. 8	7.04			1.05	1.29	1.41	1.19	0.98			8.48
Sept. 9	9.14			0.96	1.13	1.36	1.05	0.85			7.29
Sept. 10	11.81			0.71	0.97	1.38					10.59
Sept. 21	8.18		0.86	1.02	1.18	1.45					8.18
Sept. 23	6.27		1.08	1.20	1.37	1.58	1.36	1.16			6.50
Sept. 24	6.50		0.78	1.16	1.26						5.16
Sept. 28	4.75		0.90	1.20	1.34	1.50	1.35	1.10			6.27
Sept. 29	5.36		1.06	1.20	1.34	1.50	1.33	1.17			5.16
Sept. 30	5.16			1.06	1.24	1.45					6.27
Means			0.94	1.08	1.24	1.47	1.27	1.06			4.75
Departures			+0.04	+0.06	+0.08	+0.09	+0.11	+0.04			4.57

**Lincoln, Nebr.**

Sept. 1	9.47						1.27	1.04	0.98	0.90	8.18
Sept. 2	9.83						1.29	1.15			10.21
Sept. 3	9.47		0.97	1.00	1.21	1.46					10.59
Sept. 5	9.83		0.79	0.95	1.17	1.39	1.05	0.98	0.90	0.77	9.83
Sept. 6	8.48		0.87	1.00	1.17	1.39	1.20	1.03	0.91	0.76	12.68
Sept. 7	9.47	0.77	0.84	0.95	1.13	1.33	1.10	0.87	0.71		11.81
Sept. 13	10.21					1.37	1.15	0.97	0.83	0.73	9.14
Sept. 14	10.59					1.34	1.14	0.96	0.80	0.70	7.04
Sept. 16	6.76			1.02	1.19	1.42					9.47
Sept. 20	6.27	0.80	0.90	1.03	1.21	1.48	1.16	0.96	0.80	0.69	7.29
Sept. 27	6.02				1.31		1.21	1.10	1.00	0.90	5.56
Sept. 28	7.57			1.26	1.35	1.46					7.29
Sept. 29	7.29			1.02	1.37						4.95
Means		(0.78)	0.87	1.03	1.23	1.40	1.17	1.01	0.87	0.78	
Departures		+0.02	+0.04	+0.03	+0.05	+0.00	+0.03	+0.04	+0.04	+0.05	

\* Extrapolated.